that 'Acala 1517–V' variety produced higher card-room dust levels than did the 'Stoneville 213' machine-picked or brush-stripped cottons, and that 'Stoneville 213' brush-stripped cotton produced higher dust levels than the 'Stoneville 213' machine-picked cotton (table 27). Dust levels, as determined by the personal sampler, were not affected by the number of lint cleaners used. Therefore, dust levels are affected by the change in nonlint content resulting from the use of lint cleaners and not the lint cleaners per se.

An increase in the level of mill cleaning reduced card-room dust levels significantly.

SUMMARY

Cottons grown in the Mississippi Delta and in New Mexico were processed through the experimental card room at Clemson, S.C., to determine the influence of harvest method, gin conditioning and cleaning levels, and mill-cleaning level on card-room dust levels.

Gin drying reduced card-room dust levels significantly for both brush-stripped and machine-picked cottons. Reductions were about 20 percent for the brush-stripped cotton and about 14 percent for the machine-picked cotton, when compared with the cottons ginned without drying.

Lint cleaning at gins reduced dust levels significantly for all cottons tested. Reductions were about 22 percent and 19 percent for the 'Stoneville 213' brush-stripped and machine-picked cottons, respectively, and about 17 percent for the machine-picked 'Acala 1517–V' variety.

Added cleaning at the mill also reduced dust levels significantly for all cottons tested. For the 'Stoneville 213' brush-stripped and machine-picked cottons, reductions were about 11 and 12 percent, respectively, and for the 'Acala 1517–V', the reduction was about 19 percent.

Based on extreme means for treatment combinations, maximum reduction in dust level for the 'Stoneville 213' brush-stripped cotton was about 41 percent, for the 'Stoneville 213' machine-picked cotton about 43 percent, and for the 'Acala 1517–V' machine-picked cotton about 44 percent.

The 'Stoneville 213' machine-picked cotton produced a lower dust level than both the 'Stoneville 213' brush-stripped and the 'Acala 1517–V' machine-picked cottons, but there was no difference between the 'Stoneville 213' brush-stripped and the 'Acala 1517–V' machine-picked cottons. However, an analysis of covariance, with the nonlint content in the bale as the covariate, showed that the 'Acala 1517–V' machine-picked cotton produced a higher card-room dust level than did the 'Stoneville 213' brush-stripped cotton. A similar analysis showed that dust levels were affected by the change in nonlint content resulting from the use of lint cleaners and not the effect of the lint cleaners per se.

Although all test variables had a significant effect on card-room dust levels, it is doubtful that reductions were sufficient to preclude use of additional control devices at the mill to maintain dust levels within OSHA standards.

For the 'Stoneville 213' brush-stripped cotton, there was a high degree of correlation between card-room dust level and classer's leaf index, classer's composite grade index, total waste in lint, total waste in the picker lap, and card waste. For the 'Stoneville 213' machine-picked cotton, the degree of correlation was similar but not as high. Dust levels for both methods of harvest decreased as leaf index and composite grade index increased. All other correlations were positive. Generally, the same degree of correlation was evident with the 'Acala 1517–V' variety, but correlations were lower than that of the 'Stoneville 213' machine-picked cotton. For the 'Acala 1517–V' variety, there was a negative correlation between card-room dust level and opening and picking waste.

HARVESTING AND PROCESSING FACTORS AFFECTING COTTON-DUST LEVELS IN THE CARD ROOM

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HARVESTING AND PROCESSING FACTORS AFFECTING COTTON-DUST LEVELS IN THE CARD ROOM

By Joseph B. Cocke, Richard A. Wesley, and Ivan W. Kirk[1]

ABSTRACT

Cottons grown in the Mississippi Delta and in New Mexico were processed through an experimental card room at the Cotton Quality Research Station, Clemson University, Clemson, S.C., to determine the influence of harvesting, ginning, and mill-processing methods on card-room dust levels. The data presented will enable cotton processors to determine the dust potential of cottons during processing and aid in the design and maintenance of an adequate control system. **KEYWORDS: byssinosis, cotton, cotton drying, cotton dust, cotton ginning, cotton harvesting, lint-cotton cleaning, mill processing (cotton), seed-cotton cleaning.**

INTRODUCTION

Cotton dust is generated into the atmosphere as a result of the processing of cotton fibers, combined with any naturally occurring materials such as stems, leaves, bracts, and inorganic matter that may have accumulated on the cotton fibers during the growing or harvesting period.[2] Cotton dust, or an agent in the dust, is thought to be the cause of byssinosis, a respiratory disease of cotton workers. The prevalance of byssinosis in Lancashire, England, cotton-mill workers was found to correlate closely with the concentration of dust.[3] To protect workers from excessive exposure to dust in textile mills, the Occupational Safety and Health Administration (OSHA) established current standards that limit employee exposure to raw-cotton dust to 1 milligram per cubic meter for an 8-hour time-weighted average.

Highest dust levels in a cotton mill are generally found in the preparation and carding areas. Production of dust is influenced in part by the dust-generation potential of the cotton being processed. Among the factors thought to affect the dust-generation potential of cotton are variety, area of production, cultural and harvesting practices, and type and amount of moisture conditioning and cleaning at the gin.

The objective of this study was to determine the influence of harvest method, gin-moisture conditioning and cleaning levels, and mill-cleaning levels on dust levels in an experimental card room.

METHODS AND MATERIALS

Production and Harvesting

Test cotton was obtained from the Mississippi Delta and from the Rio Grande Valley in New Mexico. 'Stoneville 213' was grown at the Delta Branch Experiment Station, Stoneville,

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[2] Criteria for a recommended standard can be found in National Institute for Occupational Safety and Health. 1974. Occupational Exposure to Cotton Dust. U.S. Dep. Health Educ. Welfare, Public Health Serv., Cent. Dis. Control, 159 pp.

[3] Roach, S. A., and Schilling, R. S. F. 1960. A clinical and environmental study of byssinosis in the Lancashire cotton industry. Br. J. Ind. Med. 17: 1.

Miss., according to cultural practices recommended for the area. Fields were of the same soil type and fertility, yielding approximately 875 pounds of lint per acre.

Two harvest methods were used. One-half of the cotton was defoliated and harvested before frost. Two spindle-type pickers were used in a once-over harvest on October 25, 1974. The remaining one-half was harvested by brush stripper after frost between November 1 and December 3, 1974. The prolonged harvest period was a result of constant rains that prevented operation of the stripper except for short periods.

'Acala 1517–V' was grown by a private producer near Las Cruces, N. Mex., according to cultural practices recommended for the area. No harvest-aid chemicals were applied. All cotton was first-harvest, machine-picked after frost on November 24, 1974. Three spindle-type pickers were used, all dumping into the same trailers. The field was uniform and clean at the time of harvest.

Ginning

The 'Stoneville 213' was ginned at the U.S. Cotton Ginning Research Laboratory, Stoneville, Miss. Ginning variables for the two harvest methods were lint-moisture levels and lint-cleaning levels. The three moisture levels were achieved by using either none, one, or two stages of drying at 250° F. The three lint-cleaning levels were none, one, or two stages of saw-type lint cleaning. Each treatment combination was replicated 3 times, producing 54 treatment combinations in the gin.

Both harvest methods were processed through a standard processing sequence for machine-picked cotton consisting of a feed control, a tower drier (250° F), a six-cylinder cleaner, a green-leaf and stick machine, a tower drier (250° F), a six-cylinder cleaner, an extractor-feeder, and a gin stand. Lint-moisture levels were obtained by processing cotton through the driers with no heat or by selecting the desired number of drying stages and a drying temperature of 250° F. Lint-cleaning levels were obtained by bypassing the lint-cleaning system or by using the required number of saw-type lint cleaners in the processing system following the gin stand.

All three replications of the machine-picked cotton were ginned on October 29, 1974. Two replications of the brush-stripped cotton were ginned on November 19, 1974, and the third replication was ginned on December 5, 1974.

The 'Acala 1517–V' was ginned at the Southwestern Cotton Ginning Research Laboratory, Mesilla Park, N. Mex. Ginning variables were seed-cotton cleaning and lint cleaning. One-half of all lots bypassed the seed-cotton-cleaning system, going directly from the drier to the extractor-feeder. All other lots went from the drier through a six-cylinder cleaner, a green-leaf and stick machine, a six-cylinder cleaner, and a third six-cylinder cleaner to the extractor-feeder. Wagon seed-cotton moisture averaged 7.5 percent, indicating that satisfactory gin processing should be achieved without drying; therefore, ambient air was used in the drier for all lots. The three lint-cleaning levels were none, one, or two stages of saw-type lint cleaning. Each treatment combination was replicated 3 times producing a total of 18 treatment combinations in the gin. The 'Acala 1517–V' was ginned December 5–9, 1974.

Seed-cotton and lint samples were extracted during processing at both ginning laboratories for analysis for moisture and trash (tables 1–5). For the 'Stoneville 213', seed-cotton moisture and trash levels at the feeder apron were significantly lower than they were at the wagon for both harvest methods.

The seed-cotton-moisture level of the 'Stoneville 213' machine-picked cotton was significantly higher than that of the brush-stripped cotton at the wagon, but there was no difference between the two at the feeder apron. Total trash levels in the brush-stripped cotton were significantly higher than that of the machine-picked cotton at both the wagon and feeder apron.

For the 'Acala 1517–V', seed-cotton-moisture level was significantly lower at the feeder apron than at the wagon, even though no drying was used. Trash levels were also significantly lower at the feeder apron.

Lint moisture for both methods of harvest of the 'Stoneville 213' cotton decreased as the number of drying stages increased. The level of lint cleaning had no statistically significant effect on lint moisture, but the trend indicated a decrease in lint moisture as the number of lint-cleaning stages was increased.

TABLE 1.—*Moisture and trash levels in seed cotton of* 'Stoneville 213' *machine-picked cotton*

[Percent]

Gin-test variable	Seed-cotton moisture	Trash			
		Hulls	Sticks	Other	Total
	Wagon Samples				
Replication:					
1	14.4	1.62	0.55	2.49	4.51
2	12.6	1.69	.53	2.80	5.02
3	13.8	1.48	.50	2.59	4.58
Number of driers:[1]					
0	14.2	1.52	.55	2.16a	4.23
1	13.3	1.60	.52	3.03b	5.15
2	13.3	1.67	.51	2.70ab	4.73
Average[1]	13.6a	1.60a	.53a	2.63a	7.87a
	Feeder-Apron Samples				
Replication:					
1	11.7	0.23	0.38	1.09	1.70
2	10.4	.17	.34	1.03	1.54
3	10.9	.09	.38	1.14	1.60
Number of driers:[1]					
0	12.3a	.11	.44	1.08	1.63
1	10.8ab	.15	.31	1.13	1.59
2	9.9b	.23	.35	1.04	1.62
Average[1]	11.0b	.16b	.37b	1.09b	1.61b

[1] Means not having a letter in common are significantly different at the 1% level.

TABLE 2.—*Moisture and trash levels in seed cotton of* 'Stoneville 213' *brushed-stripped cotton*

[Percent]

Gin-test variable	Seed-cotton moisture	Trash			
		Hulls	Sticks	Other	Total
	Wagon Samples				
Replication:[1]					
1	12.4	20.22	4.47a	2.13ab	26.82
2	12.7	19.88	3.60a	2.26b	25.74
3	11.0	19.51	7.02b	1.94a	28.48
Number of driers:					
0	11.6	20.26	4.86	2.13	27.25
1	12.7	19.44	4.86	2.07	26.37
2	11.6	19.91	5.37	2.14	27.42
Average	[2]12.0a	[2]19.87a	[1]5.03a	[2]2.11a	[2]27.01a
	Feeder-Apron Samples				
Replication:					
1	[2]11.2a	[1]2.80ab	[2]3.48a	1.23	[1]7.51a
2	11.0a	3.15a	3.41a	1.30	7.86a
3	9.6b	2.56b	5.78b	1.19	9.54b
Number of driers:[2]					
0	11.7a	3.27a	4.16	1.42	8.86
1	10.7a	2.62b	4.26	1.15	8.04
2	9.3b	2.62b	4.25	1.14	8.01
Average	[2]10.6b	[2]2.84b	[1]4.22b	[2]1.24b	[2]8.30b

[1] Means not having a letter in common are significantly different at the 5% level.
[2] Means not having a letter in common are significantly different at the 1% level.

For the 'Acala 1517–V' cotton, lint-moisture-treatment means were significantly different, although numerical differences were small and drying level was not a gin-test variable.

A sufficient quantity of seed cotton was used for each gin-treatment combination to produce a bale weighing about 300 pounds.

At both ginning locations treatments were randomized within replications.

Mill Processing

Mill processing was performed at the USDA Cotton Quality Research Station, Clemson University, Clemson, S.C. Two cleaning levels were used. One-half of each 300-pound bale was processed through the entire opening-picking line and formed into laps. The opening-picking line consists of three blender-feeders, a vertical

TABLE 3.—*Moisture and trash levels in seed cotton of* 'Stoneville 213' *cottons*

[Percent]

Sampling location and harvest method	Seed-cotton moisture	Trash			
		Hulls	Sticks	Other	Total
Wagon:[1]					
Brush-stripped	12.0a	19.87a	5.03a	2.11a	27.01a
Machine-picked	13.6b	1.60b	.53b	2.63b	4.70b
Feeder apron:					
Brush-stripped	10.6	[1]2.84a	[1]4.22a	[2]1.24a	[1]8.30a
Machine-picked	11.0	.16b	.37b	1.09b	1.61b

[1] Means not having a letter in common are significantly different at the 1% level.
[2] Means not having a letter in common are significantly different at the 5% level.

TABLE 4.—*Moisture and trash levels in seed cotton of* 'Acala 1517–V' *machine-picked cotton*

[Percent]

Gin-test variable	Seed-cotton moisture	Trash			
		Hulls	Sticks	Motes&fine	Total
	Wagon Samples				
Replication:[1]					
1	7.6ab	1.8	0.5	3.4	5.8
2	7.8a	1.3	.5	3.5	5.3
3	7.2b	1.8	.5	3.8	6.1
Seed-cotton-cleaning level:					
Bypass overhead	7.6	1.6	.5	3.5	5.7
Through overhead	7.5	1.7	.5	3.6	5.7
Average[2]	7.5a	1.6a	.5a	3.6a	5.7a
	Feeder-Apron Samples				
Replication:[1]					
1	7.0	0.4	0.2	1.5a	2.2
2	7.4	.3	.1	1.6a	2.0
3	7.1	.3	.2	1.8b	2.3
Seed-cotton-cleaning level:[2]					
Bypass overhead	7.3	.3	.2	1.9a	2.5a
Through overhead	7.1	.4	.2	1.3b	1.8b
Average[2]	7.2b	.4b	.2b	1.6b	2.2b

[1] Means not having a letter in common are significantly different at the 5% level.
[2] Means not having a letter in common are significantly different at the 1% level.

opener and a No. 12 lattice opener, and a two-section one-process picker. The other one-half of each bale bypassed the vertical and lattice openers, going directly from the blender-feeders to the picker. The two cleaning levels are referred to as maximum and minimum, respectively. Each one-half bale produced between three and four laps. Trash removed in the cleaning processes was collected and weighed. Samples were extracted from the feeder and from the lap to determine the trash content of lint.

Each lap was then processed through the completely controlled experimental card room at standard test conditions as follows: temperature, 75° F; relative humidity, 55 percent; airflow rate, 550 cubic feet per minute; changes of room air, 11.5 per hour; and card-production rate, 20 pounds per hour.

During the test period of about 6 hours, dust samples were obtained simultaneously at four locations with the personal sampler and at two locations with the vertical elutriator sampler.[4] The quantity of dust in the test cotton determined the sampling time and the number of samples obtained during the test period. The number of samples per lot was 4 or 5 for each personal sampler and 8 to 10 for each elutriator sampler.

[4] Cocke, Joseph B., Hatcher, J. D., and Smith, D. L. 1975. Experimental card room for studying dust generation by cotton. Am. Text. Rep. Bull. AT-4(5): 16–21.

Statistical Analysis

An analysis of variance, in conjunction with Duncan's new multiple-range test, was used to determine the statistical significance of the differences between the treatment levels of moisture and trash at the gin for each of the three combinations of variety and harvest method. The design was a randomized complete block involving a factorial treatment arrangement.

Statistical analysis of data that included both gin- and mill-processing variables are discussed below. Duncan's new multiple-range test was used to determine the statistical significance of differences between treatment means.

Variables for each harvest of the 'Stoneville 213' variety were three moisture levels, three lint-cleaning levels, and two levels of mill cleaning with three replications. Comparisons of the three test variables and test items for each

TABLE 5.—*Treatment means of the moisture content of the lint of test cottons*

[Percent]

Test variable	'Stoneville 213'[1]		'Acala 1517–V'
	Brush-stripped[3]	Machine-picked[3]	machine-picked[2]
Replication:			
1	8.00a	6.54	[4]6.31a
2	7.40a	5.91	6.79b
3	5.22b	5.98	6.63b
Number of driers:			
0	9.04a	7.91a	([5])
1	6.72b	6.14b	([5])
2	4.85c	4.38c	([5])
Seed-cotton-cleaning level:			
Bypass overhead	([5])	([5])	[4]6.77a
Through overhead	([5])	([5])	6.36b
Number of lint cleaners:			
0	7.13	6.27	[3]6.57ab
1	6.79	6.20	6.39a
2	6.70	5.97	6.74b
Average	6.87	6.14	6.57

[1] Samples taken from lint slide.

[2] Samples taken from lint slide when no lint cleaning was used. All other samples were from first lint-cleaner condenser.

[3] Means not having a letter in common are significantly different at the 5% level.

[4] Means not having a letter in common are significantly different at the 1% level.

[5] Not a test variable for this cotton.

harvest method were made by an analysis of variance for a split-split plot design. The main plot factor was moisture level. Subplots were the three lint-cleaning levels, and sub-subplots were the two mill-cleaning levels.

When data for the two 'Stoneville 213' harvest methods were combined for analysis, a split-split-split plot design was used. The main plot factor was harvest method. Subplots were the three moisture levels, sub-subplots were the three lint-cleaning levels, and sub-sub-subplots were the two mill-cleaning levels.

For the 'Acala 1517–V', variables were the two seed-cotton-cleaning levels, three lint-cleaning levels, and two mill-cleaning levels with three replications. An analysis of variance for a split-split-plot design was used for comparisons of the three test variables and for test items. The main plot factor was seed-cotton cleaning. Subplots were the three lint-cleaning levels, and sub-subplots were the two mill-cleaning levels.

When all three test cottons were combined for analysis, variables were the three combinations of variety and harvest method, three lint-cleaning levels, and two mill-cleaning levels with three replications. An analysis of variance for a split-split plot design was used. The main plot factor was variety and harvest method. Subplots were the three lint-cleaning levels, and sub-subplots were the two mill-cleaning levels.

The three test cottons were also combined for an analysis of covariance of the two common test variables and selected measures of evaluation on dust concentrations with total nonlint content in the bale as the covariate.

RESULTS AND DISCUSSION

The number of driers and lint cleaners used in the gin and the level of mill cleaning had a significant effect on card-room dust levels produced by both brush-stripped and machine-picked 'Stoneville 213' variety grown in the Mississippi Delta (table 6). Brush-stripped cotton processed through either one or two stages of drying produced lower card-room dust levels, as indicated by both sampling methods,

TABLE 6.—*Card-room dust levels of brush-stripped and machine-picked 'Stoneville 213' cotton*[1]

[Milligrams per cubic meter]

Test variable	Brushed-stripped		Machine-picked	
	Personal sampler	Vertical elutriator sampler	Personal sampler	Vertical elutriator sampler
Replication:				
1	4.83	4.33	3.14a	2.95
2	4.98	4.41	3.28a	3.08
3	4.81	4.37	3.65b	3.09
Number of driers:				
0	5.54a	4.90a	3.57a	3.17a
1	4.64b	4.18b	3.54a	3.17a
2	4.44b	4.03b	3.06b	2.77b
Number of lint cleaners:				
0	5.54a	5.00a	3.79a	3.45a
1	4.78b	4.26b	3.20b	2.93b
2	4.30c	3.85b	3.08b	2.73b
Mill-cleaning level:				
Minimum[2]	5.14a	4.62a	3.57a	3.23a
Maximum[3]	4.60b	4.12b	3.15b	2.85b
Average	4.87	4.37	3.36	3.04

[1] Means not having a letter in common are significantly different at the 1% level.

[2] Cotton bypassed the vertical and lattice openers, going directly from the blender-feeders to the picker.

[3] Cotton processed through the entire opening-picking line: 3 blender-feeders, a vertical opener, a No. 12 lattice opener, and a 2-section 1-process picker.

than the treatment that was not dried. For machine-picked cotton, treatments processed through two stages of drying produced lower dust levels than treatments that were not dried or treatments that were processed through only one stage of drying. Dust levels trended lower as the number of drying stages was increased. Maximum reduction in dust levels among the three drying levels was about 20 percent.

For the brush-stripped cotton, dust levels determined by the personal sampler indicated that each succeeding stage of lint cleaning reduced the card-room dust level significantly. The elutriator sampler indicated that both one and two stages of lint cleaning reduced dust levels significantly, but the difference between the two stages was not significant. For the machine-picked cotton, both one and two stages of lint cleaning reduced dust levels over that of no lint cleaning, but there was no difference between one and two stages of lint cleaning.

Maximum reduction in dust levels determined by the personal sampler among the three lint-cleaning levels was about 22 percent for the brush-stripped cotton and about 19 percent for the machine-picked cotton.

A mill cleaning system that included both the vertical and lattice openers produced lower card-room dust levels than a cleaning system that did not include the two cleaners. Reductions in dust levels were about 11 percent for the brush-stripped cotton and about 12 percent for the machine-picked cotton, when the two cleaners were used.

Based on extreme means for treatment combinations, maximum reduction in dust levels was about 43 percent for the three test variables in combination (table 7). The combination of two test variables that produced the greatest decrease in dust levels was the combination of gin drying and lint cleaning, which reduced dust levels by about 38 percent. Maximum re-

TABLE 7.—*Maximum reductions in dust levels, based on extreme means, for treatment combinations for* 'Stoneville 213' *variety harvested by two methods*[1]

[Percent]

Treatment combination and harvest method	Sampling method	
	Personal	Vertical elutriator
Gin drying×lint cleaning×mill cleaning:		
Brush-stripped	41	41
Machine-picked	43	43
Gin drying×lint cleaning:		
Brush-stripped	38	37
Machine-picked	34	35
Gin drying×mill cleaning:		
Brush-stripped	28	26
Machine-picked	25	24
Lint cleaning×mill cleaning:		
Brush-stripped	28	29
Machine-picked	28	30

[1] Reductions based on dust levels obtained with no drying, no lint cleaning, and minimum mill cleaning.

TABLE 8.—*Classer's grade indices,* 'Stoneville 213' *brush-stripped cotton*[1]

Test variable	Color	Leaf	Composite[2]
Replication:[3]			
1	90a	82a	74.3a
2	90a	82a	74.3a
3	88b	85b	77b
Number of driers:[4]			
0	87a	80a	72.7a
1	90b	83b	75b
2	91b	86c	78c
Number of lint cleaners:[4]			
0	85a	76a	76a
1	90b	84b	84b
2	93c	89c	89c

[1] Index: Middling White (31) = 100.

[2] Most of the bales were reduced 1 grade because of bark.

[3] Means not having a letter in common are significantly different at the 5% level.

[4] Means not having a letter in common are significantly different at the 1% level.

TABLE 9.—*Classer's grade indices,* 'Stoneville 213' *machine-picked cotton*[1]

Test variable	Color	Leaf	Composite
Replication:[2]			
1	95.9	88a	87.7
2	96.4	91b	89.4
3	97.3	87a	90.8
Number of driers:[2]			
0	96.7a	85a	87.2a
1	95a	90b	88.4ab
2	98b	91b	92.2b
Number of lint cleaners:[2]			
0	93.2a	83a	82.9a
1	98.8b	90b	90.8b
2	98.7b	93b	94.2b

[1] Index: Middling White (31) = 100.

[2] Means not having a letter in common are significantly different at the 1% level.

TABLE 10.—*Total waste in lint and waste removed in mill processing,* 'Stoneville 213' *brush-stripped cotton*[1]

[Percent]

Test variable	Total waste in lint	Opening and picking waste	Card waste	Total waste in picker lap
Replication:				
1	7.66	2.10	7.00	6.81
2	7.14	2.35	7.34	6.95
3	7.51	2.06	7.02	6.62
Number of driers:[2]				
0	8.57a	2.41	8.20a	8.17a
1	7.31b	2.15	6.88b	6.46b
2	6.42b	1.95	6.27c	5.74c
Number of lint cleaners:[2]				
0	11.22a	4.13a	9.60a	9.02a
1	6.04b	1.40b	6.41b	6.14b
2	5.04b	.99b	5.34c	5.21c
Mill-cleaning level:[2 3]				
Minimum	([4])	1.14a	7.62a	7.14a
Maximum	([4])	3.20b	6.61b	6.44b

[1] Determined by Shirley analyzer, ASTM D 2812–70.
[2] Means not having a letter in common are significantly different at the 1% level.
[3] For explanation of minimum and maximum, see table 6, notes 2 and 3.
[4] Not applicable.

TABLE 11.—*Total waste in lint and waste removed in mill processing,* 'Stoneville 213' *machine-picked cotton*[1]

[Percent]

Test variable	Total waste in lint	Opening and picking waste	Card waste	Total waste in picker lap
Replication:[2]				
1	4.72ab	1.23	3.96	3.57
2	4.51a	1.12	3.77	3.26
3	5.06b	1.19	3.88	3.36
Number of driers:[3]				
0	5.22a	1.28	4.34a	3.97a
1	4.88a	1.18	3.88ab	3.36b
2	4.29b	1.08	3.39b	2.87c
Number of lint cleaners:[3]				
0	6.69a	2.02a	5.01a	4.33a
1	4.41b	.88b	3.62b	3.33b
2	3.19c	.64b	2.98c	2.54c
Mill-cleaning level:[4]				
Minimum	([5])	[3].57a	4.05	[2]3.59a
Maximum	([5])	1.79b	3.69	3.21b

[1] Determined by Shirley analyzer, ASTM D 2812–70.
[2] Means not having a letter in common are significantly different at the 5% level.
[3] Means not having a letter in common are significantly different at the 1% level.
[4] For explanation of minimum and maximum, see table 6, notes 2 and 3.
[5] Not applicable.

ductions for the combinations of gin drying and mill cleaning and the combinations of lint cleaning and mill cleaning were about equal. Differences between harvest methods and between samplers were about equal for all treatment combinations.

Color and leaf factors of grade and composite grade index increased as the number of driers and lint cleaners used at the gin were increased for both the 'Stoneville 213' brush-stripped and machine-picked cottons (tables 8 and 9). Total waste in lint also decreased as the number of driers and the number of lint cleaners were increased (tables 10 and 11). Opening and picking waste, card waste, and total waste in the picker lap were reduced significantly or trended lower as the number of driers and lint cleaners used at the gin increased and when maximum cleaning was used at the mill.

Data in table 12 indicate, for 'Stoneville 213' brush-stripped cotton, that the correlation coefficient between dust level and classer's leaf index, classer's composite grade index, total waste in lint, total waste in picker lap, and card waste was between 0.71 and 0.83. Dust levels decreased as the leaf grade and composite grade improved, and increased as waste in lint, waste in picker lap, and card waste increased.

For 'Stoneville 213' machine-picked cotton, correlation coefficients between dust level and classer's leaf index, classer's composite grade index, total waste in lint, total waste in picker lap, and card waste were not as high as they were for the brush-stripped cotton, but response was similar (table 13). Correlations were higher for dust levels determined by the elutriator sampler than they were for dust

TABLE 12.—*Simple correlation coefficients between dust levels and selected measures of evaluation,* 'Stoneville 213' *brush-stripped cotton*

Measure of evaluation	Sampling method			
	Personal		Vertical elutriator	
	r	Significance probability	r	Significance probability
Classer's leaf index	−0.73	0.0001	−0.76	0.0001
Classer's composite grade index	−.73	.0001	−.75	.0001
Total waste in lint (Shirley analyzer)	.71	.0001	.75	.0001
Total waste in picker lap (Shirley analyzer)	.83	.0001	.87	.0001
Opening and picking waste	.34	.0121	.33	.0149
Card waste	.79	.0001	.84	.0001

TABLE 13.—*Simple correlation coefficients between dust levels and selected measures of evaluation,* 'Stoneville 213' *machine-picked cotton*

Measure of evaluation	Sampling method			
	Personal		Vertical elutriator	
	r	Significance probability	r	Significance probability
Classer's leaf index	−0.47	0.0005	−0.52	0.0002
Classer's composite grade index	−.25	.0643	−.45	.0011
Total waste in lint (Shirley analyzer)	.57	.0001	.67	.0001
Total waste in picker lap (Shirley analyzer)	.53	.0001	.66	.0001
Opening and picking waste	.09	.5194	.13	.6455
Card waste	.47	.0004	.63	.0001

TABLE 14.—*Card-room dust levels, combined harvest methods,* 'Stoneville 213' *cotton*

[Milligrams per cubic meter]

Test variable	Sampling method	
	Personal	Vertical elutriator
Replication:		
1	3.99	3.64
2	4.13	3.75
3	4.23	3.73
Harvest method:[1]		
Brush-stripped	4.87a	4.37a
Machine-picked	3.36b	3.04b
Number of driers:[1]		
0	4.55a	4.04a
1	4.05ab	3.68ab
2	3.75b	3.40b
Number of lint cleaners:[1]		
0	4.67a	4.23a
1	3.99b	3.60b
2	3.69b	3.29b
Mill-cleaning level:[1 2]		
Minimum	4.36a	3.93a
Maximum	3.88b	3.48b

[1] Means not having a letter in common are significantly different at the 1% level.

[2] For explanation of minimum and maximum, see table 6, notes 2 and 3.

TABLE 15.—*Classer's grade indices, combined harvest methods,* 'Stoneville 213' *cotton*[1]

Test variable	Color	Leaf	Composite[2]
Replication:			
1	92.9	85.0	81.0
2	93.2	86.5	81.9
3	92.7	86.0	83.9
Harvest method:[3]			
Brush-stripped	89.3a	83.0a	75.2a
Machine-picked	96.6b	88.7b	89.3b
Number of driers:			
0	[4]91.8a	[3]82.5a	[4]79.9a
1	92.5ab	86.5b	81.7ab
2	94.5b	88.5b	85.1b
Number of lint cleaners:[3]			
0	89.1a	79.5a	76.4a
1	93.9b	87.0b	83.2b
2	95.8b	91.0c	87.1b

[1] Index: Middling White (31) =100.

[2] In some cases composite grade was reduced because of grass or bark.

[3] Means not having a letter in common are significantly different at the 5% level.

[4] Means not having a letter in common are significantly different at the 1% level.

TABLE 16.—*Total waste in lint and waste removed in mill processing,* 'Stoneville 213' *cotton*[1]

[Percent]

Test variable	Total waste in lint	Opening and picking waste	Card waste	Total waste in picker lap
Replication:				
1	6.19	1.66	5.48	5.19
2	5.83	1.74	5.56	5.10
3	6.28	1.62	5.45	4.99
Harvest method:[2]				
Brush-stripped	7.44a	2.17a	7.12a	6.79a
Machine-picked	4.76b	1.18b	3.87b	3.40b
Number of driers:[2]				
0	6.90a	1.85	6.27a	6.07a
1	6.10ab	1.66	5.38ab	4.91b
2	5.30b	1.52	4.83b	4.30b
Number of lint cleaners:[2]				
0	8.96a	3.08a	7.31a	6.67a
1	5.23b	1.14b	5.02b	4.74b
2	4.12c	.82b	4.16b	3.87b
Mill-cleaning level:[2 3]				
Minimum	([4])	.86a	5.84	5.36
Maximum	([4])	2.49b	5.15	4.83

[1] Determined by Shirley analyzer, ASTM D 2812–70.

[2] Means not having a letter in common are significantly different at the 1% level.

[3] For explanation of minimum and maximum, see table 6, notes 2 and 3.

[4] Not applicable.

TABLE 17.—*Simple correlation coefficients between dust levels and selected measures of evaluation, combined harvest methods,* 'Stoneville 213' *cotton*

Measure of evaluation	Sampling method			
	Personal		Vertical elutriator	
	r	Significance probability	r	Significance probability
Gin drying	−0.31	0.0016	−0.29	0.0031
Lint cleaning	−.37	.0002	−.42	.0001
Mill cleaning	−.22	.0185	−.24	.0106
Color grade index	−.78	.0001	−.82	.0001
Leaf grade index	−.69	.0001	−.71	.0001
Composite grade index	−.76	.0001	−.81	.0001
Total waste in lint	.75	.0001	.78	.0001
Total waste in picker lap	.87	.0001	.91	.0001
Opening and picking waste	.41	.0001	.41	.0001
Card waste	.85	.0001	.89	.0001

levels determined by the personal sampler for both the brush-stripped and the machine-picked cottons.

When the data from both harvest methods for the 'Stoneville 213' variety were combined for analysis, the brush-stripped cotton produced higher card-room dust levels than the machine-picked cotton (table 14). Drying level, lint-cleaning level, and mill-cleaning level all significantly affected card-room dust levels, the dust level decreasing as the level of each variable was increased.

For the brush-stripped cotton, grade designation was lower, and total waste in lint and in the picker lap was higher than that of the machine-picked cotton (tables 15 and 16). As expected, total waste in lint decreased and grades increased as levels of drying and lint cleaning were increased.

The highest correlation coefficient (0.87) was between dust level and total waste in the picker lap (table 17). For the three test variables of drying, lint cleaning, and mill cleaning, correlation coefficients were 0.31, −0.37, and −0.22, respectively. Dust levels decreased as gin drying, lint cleaning, and mill-cleaning levels increased, and as color, leaf, and composite grade index increased. Dust levels decreased as total waste in lint and picker lap, opening and picking waste, and card waste decreased.

Mill cleaning had a significant effect on card-room dust levels produced by 'Acala 1517–V' cotton (table 18). When both the vertical and lattice openers were included in the mill cleaning, card-room dust levels, as determined by the personal sampler, were reduced about 19 percent.

Lint cleaning had no effect on dust levels of the 'Acala 1517–V' cotton as determined by the elutriator sampler, but for dust levels determined by the personal sampler, cotton processed through two saw-type lint cleaners produced significantly less dust than cotton processed

TABLE 18.—*Card-room dust levels,* 'Acala 1517–V' *cotton*

[Milligrams per cubic meter]

Test variable	Sampling method	
	Personal	Vertical elutriator
Replication:[1]		
1	5.06ab	4.25ab
2	5.59a	4.84a
3	4.07b	3.64b
Seed-cotton-cleaning level:		
Bypass overhead	5.05	4.31
Through overhead	4.76	4.19
Number of lint cleaners:[2]		
0	5.17a	4.35
1	5.26a	4.58
2	4.30b	3.81
Mill-cleaning level:[3]		
Minimum	[1]5.43a	[2]4.58a
Maximum	4.39b	3.91b

[1] Means not having a letter in common are significantly different at the 1% level.

[2] Means not having a letter in common are significantly different at the 5% level.

[3] For explanation of minimum and maximum, see table 6, notes 2 and 3.

TABLE 19.—*Total waste in lint and waste removed in mill processing, 'Acala 1517–V' cotton*[1]

[Percent]

Test variable	Total waste in lint	Opening and picking waste	Card waste	Total waste in picker lap[2]
Replication:[3]				
1	4.27	1.23	2.89a	3.03a
2	4.52	1.33	3.00ab	3.51b
3	4.68	1.49	3.22b	.....
Seed-cotton-cleaning level:				
Bypass overhead	[4]4.92a	[3]1.51a	[3]3.16a	3.22
Through overhead	4.06b	1.19b	2.91b	3.32
Number of lint cleaners:[4]				
0	7.73a	2.54a	4.22a	4.22a
1	3.60b	.91b	2.69b	2.94b
2	2.13c	.59b	2.21c	2.65b
Mill-cleaning level:[4 5]				
Minimum	([6])	.71a	3.33a	3.58a
Maximum	([6])	1.99b	2.74b	2.96b
Average	4.49	1.35	3.04	3.27

[1] Determined by Shirley analyzer, ASTM D 2812–70.
[2] Data are for 1st and 2d replications only.
[3] Means not having a letter in common are significantly different at the 5% level.
[4] Means not having a letter in common are significantly different at the 1% level.
[5] For explanation of minimum and maximum, see table 6, notes 2 and 3.
[6] Not applicable.

through one lint cleaner or cotton that bypassed the lint-cleaning system. The reduction was about 17 percent.

There were no differences in dust levels produced by cotton that bypassed the seed-cotton-cleaning system at the gin and cotton that was processed through the seed-cotton-cleaning system. Total waste in cotton that bypassed the seed-cotton-cleaning system was significantly greater than that of cotton processed through the cleaning system, but after being processed through the mill cleaning, there was no difference in the total waste in lap between the two (table 19).

One of the treatments in the third replication produced a dust level significantly lower than that of all other treatments in the replication and about 72 percent lower than the average for the first two replications of the same treatment. Routine chemical analysis of fiber samples showed that the bale was contaminated with a hydrocarbon oil at a concentration of about 0.3 percent. Earlier tests had shown that adding hydrocarbon oil to cotton during processing could reduce card-room dust levels significantly. Analysis of wagon seed-cotton samples at the ginning laboratory confirmed the presence of oil, indicating that the contamination occurred before the cotton was delivered to the gin. The overall results appear to have been influenced somewhat by the lot contaminated with oil.

Based on extreme means for treatment combinations, maximum reduction in dust levels was about 44 percent for the three test variables in combination (table 20). The combination of

TABLE 20.—*Maximum reductions in dust levels, based on extreme means, for treatment combinations for 'Acala 1517–V' cotton*[1]

[Percent]

Treatment combination	Sampling method	
	Personal	Vertical elutriator
Gin cleaning×lint cleaning×mill cleaning	44	38
Gin cleaning×lint cleaning	30	26
Gin cleaning×mill cleaning	24	18
Lint cleaning×mill cleaning	34	27

[1] Reductions based on dust levels obtained with no gin cleaning, no lint cleaning, and minimum mill cleaning.

TABLE 21.—*Classer's grade indices, 'Acala 1517–V' cotton*[1]

Test variable	Color	Leaf	Composite grade
Replications:			
1	92	85	87.2
2	91	84	86.7
3	91	85	86.7
Seed-cotton-cleaning level:			
Bypass overhead	91.7	84.3	87
Through overhead	91	85	86.7
Number of lint cleaners:[2]			
0	85a	75a	77.7a
1	94b	85b	88.3b
2	95b	94c	94.5c

[1] Index: Middling White (31) = 100.

[2] Means not having a letter in common are signficantly different at the 1% level.

lint cleaning and mill cleaning reduced dust levels about 34 percent, gin cleaning and lint cleaning about 30 percent, and gin cleaning and mill cleaning about 24 percent. Differences between the two sampling methods were greater than they were for the 'Stoneville 213' cotton.

The seed-cotton-cleaning system had no effect on color and leaf factors of grade or on composite grade index, but each additional stage of lint cleaning improved the leaf and composite grade index (table 21). Lint cleaning improved the color index, but there was no difference between one and two lint cleaners.

The correlation coefficients between dust levels and classer's leaf index, classer's composite grade index, total waste in lint, total waste in the picker lap, opening and picking waste, and card waste were not as high as they were with the 'Stoneville 213' variety (table 22). Total waste in the picker lap gave the best indication of the potential dust level. There was a negative correlation between card-room dust level and opening and picking waste, whereas the correlation was positive for both

TABLE 23.—*Card-room dust levels, combined varieties*

[Milligrams per cubic meter]

Test variable	Sampling method	
	Personal	Vertical elutriator
Replication:		
1	4.26	3.79
2	4.50	4.02
3	4.19	3.71
Variety and harvest method:[1]		
'Stoneville 213', brush-stripped	4.87a	4.37a
'Stoneville 213', machine-picked	3.36b	3.04b
'Acala 1517–V', machine-picked	4.91a	4.25a
Number of lint cleaners:[1]		
0	4.79a	4.26a
1	4.31ab	3.84ab
2	3.85b	3.42b
Mill-cleaning level:[1 2]		
Minimum	4.62a	4.09a
Maximum	4.00b	3.59b

[1] Means not having a letter in common are significantly different at the 1% level.

[2] For explanation of minimum and maximum, see table 6, notes 2 and 3.

TABLE 22.—*Simple correlation coefficients between dust levels and selected measures of evaluation, 'Acala 1517–V' cotton*

Measure of evaluation	Sampling method			
	Personal		Vertical elutriator	
	r	Significance probabiilty	r	Significance probability
Classer's leaf index	−0.28	0.0997	−0.22	0.1980
Classer's composite grade index	−.16	.6365	−.10	.5659
Total waste in lint (Shirley analyzer)	.15	.6118	.08	.6638
Total waste in picker lap (Shirley analyzer)	.42	.0377	.37	.0708
Opening and picking waste	−.18	.2877	−.20	.2470
Card waste	.21	.2110	.13	.5396

the brush-stripped and machine-picked 'Stoneville 213' cotton.

When data for both varieties were combined for analysis, results showed no difference in card-room dust levels produced by 'Stoneville 213' brush-stripped cotton and 'Acala 1517–V' machine-picked cotton, but dust levels produced by 'Stoneville 213' machine-picked cotton were lower than the others (table 23). Data in table 24 show that the composite grade index for 'Stoneville 213' machine-picked cotton was higher than that of both other cottons and that the composite grade index of 'Acala 1517–V' cotton was higher than that of 'Stoneville 213' brush-stripped cotton. Total waste in lint and in the picker lap of 'Stoneville 213' brush-stripped cotton was higher than that of both other cottons, but there were no differences between 'Stoneville 213' machine-picked cotton and the 'Acala 1517–V' cotton (table 25). There appears to be no clear-cut explanation for the lack of differences in dust levels produced by the 'Stoneville 213' brush-stripped cotton and the 'Acala 1517–V' cotton, even though there

TABLE 24.—*Classer's grade indices, combined varieties*[1]

Test variable	Color	Leaf	Composite[2]
Replication:			
1	92.7	85.0	82.5
2	92.7	85.9	83.1
3	92.3	85.8	84.6
Variety and harvest method:[3]			
'Stoneville 213', brush-stripped	89.3a	83.0a	75.2a
'Stoneville 213', machine-picked	96.6c	88.7b	89.3c
'Acala 1517–V', machine-picked	91.3b	84.7a	86.8b
Number of lint cleaners:[3]			
0	88.1a	78.4a	76.8a
1	93.9b	85.5b	84.5b
2	95.6b	91.8c	89.0c

[1] Index: Middling White (31) = 100.

[2] In some cases composite grade was reduced because of grass or bark.

[3] Means not having a letter in common are significantly different at the 1% level.

TABLE 25.—*Total waste in lint and waste removed in mill processing, combined varieties*[1]

[Percent]

Test variable	Total waste in lint	Opening and picking waste	Card waste	Total waste in picker lap[2]
Replication:				
1	5.71	1.55	4.83	4.65
2	5.50	1.64	4.92	4.71
3	5.88	1.59	4.89	...
Variety and harvest method:[3]				
'Stoneville 213', brush-stripped	7.44a	2.17a	7.12a	6.88a
'Stoneville 213', machine-picked	4.76b	1.18b	3.87b	3.42b
'Acala 1517–V', machine-picked	4.49b	1.35b	3.04c	3.27b
Number of lint cleaners:[3]				
0	8.65a	2.94a	6.53a	6.13a
1	4.82b	1.08b	4.43b	4.34b
2	3.62c	.76b	3.67b	3.57b
Mill-cleaning level:[4]				
Minimum	([5])	[3].82a	[6]5.21a	4.95
Maximum	([5])	2.37b	4.55b	4.40

[1] Determined by Shirley analyzer, ASTM D 2812–70.

[2] Data are for replications 1 and 2 only.

[3] Means not having a letter in common are significantly different at the 1% level.

[4] For explanation of minimum and maximum, see table 6, notes 2 and 3.

[5] Not applicable.

[6] Means not having a letter in common are significantly different at the 5% level.

TABLE 26.—*Simple correlation coefficients between dust levels and selected measures of evaluation, combined varieties*

Measure of evaluation	Sampling method			
	Personal		Vertical elutriator	
	r	Significance probability	r	Significance probability
Lint cleaning	−0.33	0.0002	−0.35	0.0001
Mill cleaning	−.26	.0017	−.26	.0020
Color grade index	−.62	.0001	−.65	.0001
Leaf grade index	−.56	.0001	−.56	.0001
Composite grade index	−.50	.0001	−.56	.0001
Total waste in lint	.47	.0001	.51	.0001
Total waste in lap	.51	.0001	.57	.0001
Opening and picking waste[1]	.23	.0066	.24	.0034
Card waste	.47	.0001	.54	.0001

[1] Data are for replications 1 and 2 only.

were significant differences in composite grade index and in the total waste in lint and in the picker lap.

Processing cotton through two saw-type lint cleaners reduced card-room dust levels significantly over that of cotton receiving no lint cleaning, but there was no difference between dust levels produced by cotton with no lint cleaning and cotton processed through one lint cleaner or between cotton processed through one lint cleaner and cotton processed through two lint cleaners. Total waste in lint decreased and composite grade index increased as additional lint cleaners were used in the gin. Total waste in lint decreased as more lint cleaners were used. This reduction was reflected in the waste removed by the opening and picking system and by the card. Waste from these processes also decreased as more lint cleaners were used.

Use of the maximum amount of mill cleaning reduced card-room dust levels significantly. More waste was removed in the opening and picking system, as expected, and less waste was removed by the card.

The correlation coefficient between dust level and classer's color grade index was higher than that of all other measures of evaluation (table 26). Dust levels decreased as lint-cleaning and mill-cleaning levels increased and as color, leaf, and composite grade index increased. Dust levels decreased as total waste in lint and in the picker lap, opening and picking waste, and card waste decreased. For the two common test variables of lint cleaning and mill cleaning, correlation coefficients were −0.33 and −0.26, respectively.

An analysis of covariance, with total nonlint content in the bale as the covariate, showed

TABLE 27.—*Effect of test variables on card-room dust levels (analysis of covariance with total nonlint content of bale as covariate)*

[Milligrams per cubic meter]

Test variable	Sampling method	
	Personal	Vertical elutriator
Replications:		
1	[1]4.25ab	[2]3.79ab
2	4.53b	4.05a
3	4.16a	3.68b
Variety and harvest method:[2]		
'Stoneville 213', brush-stripped	4.56b	4.12b
'Stoneville 213', machine-picked	3.53c	3.17c
'Acala 1517–V', machine-picked	5.13a	4.42a
Number of lint cleaners:[1]		
0	4.26	3.83ab
1	4.46	3.97a
2	4.22	3.72b
Mill-cleaning level:[2 3]		
Minimum	4.62a	4.09a
Maximum	4.00b	3.59b

[1] Means not having a letter in common are significantly different at the 5% level.

[2] Means not having a letter in common are significantly different at the 1% level.

[3] For explanation of minimum and maximum, see table 6, notes 2 and 3.

that 'Acala 1517–V' variety produced higher card-room dust levels than did the 'Stoneville 213' machine-picked or brush-stripped cottons, and that 'Stoneville 213' brush-stripped cotton produced higher dust levels than the 'Stoneville 213' machine-picked cotton (table 27). Dust levels, as determined by the personal sampler, were not affected by the number of lint cleaners used. Therefore, dust levels are affected by the change in nonlint content resulting from the use of lint cleaners and not the lint cleaners per se.

An increase in the level of mill cleaning reduced card-room dust levels significantly.

SUMMARY

Cottons grown in the Mississippi Delta and in New Mexico were processed through the experimental card room at Clemson, S.C., to determine the influence of harvest method, gin conditioning and cleaning levels, and mill-cleaning level on card-room dust levels.

Gin drying reduced card-room dust levels significantly for both brush-stripped and machine-picked cottons. Reductions were about 20 percent for the brush-stripped cotton and about 14 percent for the machine-picked cotton, when compared with the cottons ginned without drying.

Lint cleaning at gins reduced dust levels significantly for all cottons tested. Reductions were about 22 percent and 19 percent for the 'Stoneville 213' brush-stripped and machine-picked cottons, respectively, and about 17 percent for the machine-picked 'Acala 1517–V' variety.

Added cleaning at the mill also reduced dust levels significantly for all cottons tested. For the 'Stoneville 213' brush-stripped and machine-picked cottons, reductions were about 11 and 12 percent, respectively, and for the 'Acala 1517–V', the reduction was about 19 percent.

Based on extreme means for treatment combinations, maximum reduction in dust level for the 'Stoneville 213' brush-stripped cotton was about 41 percent, for the 'Stoneville 213' machine-picked cotton about 43 percent, and for the 'Acala 1517–V' machine-picked cotton about 44 percent.

The 'Stoneville 213' machine-picked cotton produced a lower dust level than both the 'Stoneville 213' brush-stripped and the 'Acala 1517–V' machine-picked cottons, but there was no difference between the 'Stoneville 213' brush-stripped and the 'Acala 1517–V' machine-picked cottons. However, an analysis of covariance, with the nonlint content in the bale as the covariate, showed that the 'Acala 1517–V' machine-picked cotton produced a higher card-room dust level than did the 'Stoneville 213' brush-stripped cotton. A similar analysis showed that dust levels were affected by the change in nonlint content resulting from the use of lint cleaners and not the effect of the lint cleaners per se.

Although all test variables had a significant effect on card-room dust levels, it is doubtful that reductions were sufficient to preclude use of additional control devices at the mill to maintain dust levels within OSHA standards.

For the 'Stoneville 213' brush-stripped cotton, there was a high degree of correlation between card-room dust level and classer's leaf index, classer's composite grade index, total waste in lint, total waste in the picker lap, and card waste. For the 'Stoneville 213' machine-picked cotton, the degree of correlation was similar but not as high. Dust levels for both methods of harvest decreased as leaf index and composite grade index increased. All other correlations were positive. Generally, the same degree of correlation was evident with the 'Acala 1517–V' variety, but correlations were lower than that of the 'Stoneville 213' machine-picked cotton. For the 'Acala 1517–V' variety, there was a negative correlation between card-room dust level and opening and picking waste.